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CARDIOVASCULAR SIDE EFFECTS OF ENERGY DRINKS

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Abstract:

This article describes in detail the effects of energy drinks, one of the most popular soft drinks, on the mechanism of heart function, muscle contraction, pulse and blood composition. With the increase in energy drink consumption over the past decade, the number of energy drink users among emergency department employees has also increased significantly. That is, there is alcohol poisoning, arrhythmia, increased blood pressure and heart rate. To observe these effects, we conducted a study among our peers.

Keywords: *Energy drinks, caffeine, taurine , Cardiovascular effects: arrhythmia, adrenaline, Baum and Weiss study, sugar, insulin, Red Bull*

ENTER

Today, the consumption of energy drinks (EVs) has increased dramatically worldwide. Today, we see that the consumption of energy drinks (EVs) has increased dramatically in Uzbekistan. We know that drinking more energy drinks is bad for human health. My team and I examined patients in the cardiology and cardiorheumatology departments of the multidisciplinary central clinic of the Tashkent Medical Academy. In the course of the examination, we divided 35 patients admitted with heart rhythm disorders and myocardial infarction into patients under 40 and over 40 years of age. As a result of the study, it was found that 6 patients suffered a myocardial infarction, and 2 patients suffered from cardiac arrhythmia. After studying the medical history of these patients, we found out that they were constantly using EVs. We found that 6 of our patients smoke at the same time as taking EV, and 2 of our patients use EV when they are nervous. We see that out of 6 patients with myocardial infarction, 1 is a woman and 5 are men. Thus, the consumption of EV is more common in men than in women.

Energy drinks (EVs) have a negative effect on the cardiovascular system. This negative effect occurs due to the biologically active substances they contain. Now let's talk about energy drinks.

One of the most popular and important subcategories of soft drinks is energy drinks (EVs). Indeed, the popularity of EV has increased significantly since its introduction around 1960 [(1),] and this subcategory has proven to be one of the fastest-growing segments in the beverage industry [(2).] Most EVs target the 18-34 age group, with a frequency of 1-4 EVs per month, and about half of "EV users" consume EVs during mental activity or work · Today, the EV market is large and diverse, with more than 200 brands in the U.S. alone . In the early 21st century, there was an early euphoria about the safety of EVs, as they cause cardiovascular complications [(5),] leading to trade restrictions and even bans in some European countries [(6).] Although these restrictions have been lifted [(7)] Lithuania became the first European country to ban the sale of EV products to minors. [(8)] A ban on the sale of goods to persons under the age of 18 is currently under consideration in the European Union. In Central Asia, especially in Uzbekistan, there are no restrictions on the sale, purchase and consumption of energy drinks. This can lead to various negative consequences in the future.

OVERALL EFFECTS OF ENERGY DRINKS ON HEMODYNAMICS

EVs have shown that in young and healthy people, 29% of people have neurological changes, and 52% of people have cardiac and cerebrovascular changes. Studies in recent years have shown that the consumption of 1 can of high-sugar EV (the volume of the drink is 355 ml) causes an increase in the load on the heart, which is confirmed by an increase in blood pressure and heart rate. Administration of EV did not lead to deterioration of microvascular endothelial function in response to acetylcholine, which suggests that impaired endothelial function, at least in the microvasculature, may not explain the effect of EV on increasing blood pressure [(9).] An interesting and seemingly novel finding from this study was that EVs reduced cerebral blood flow velocity and increased cerebrovascular resistance, slowing cerebral blood flow. In part, this process can be explained by an increase in respiratory rate. [(9)]

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EFFECTS OF CAFFEINE

The main concern with the use of EVs is related to their caffeine content and potential effects on blood pressure. Caffeine, the major active metabolite of EVs, activates the sympathetic nervous system and acts as an antagonist of the neuromodulator adenosine (11). Since adenosine's functions are predominantly inhibitory, caffeine stimulates and enhances the sympathomimetic effects leading to increased blood pressure (12) . This is because caffeine blocks the enzyme phosphodiesterase, which breaks down sAMF and causes it to accumulate in cells. sAMP is a secondary mediator through which various physiologically active substances, primarily adrenergic, are carried out. Thus, the accumulation of sAMF leads to an adrenaline-like effect. Caffeine affects the heart and other organs and systems. Caffeine has both beneficial and harmful properties for the body.

THE BENEFICIAL EFFECTS OF CAFFEINE. Caffeine is a natural stimulant that can be obtained from a variety of sources. Some of the benefits of caffeine include: Stimulant effect: Caffeine can make a person feel more rested and energized due to its stimulating effects on the brain. Therefore, people prefer to consume caffeine. Increase concentration. Caffeine boosts concentration and memory by producing chemicals that boost brain activity.

HARMFUL EFFECTS OF CAFFEINE. Consuming too much caffeine can cause a variety of side effects in many people. These are sleep problems: Caffeine can block sleep signals in the brain, causing insomnia. Drinking large amounts of caffeine before bed can cause insomnia and poor sleep. Nervousness and anxiety: Caffeine has a stimulating effect on the nervous system and, if consumed in excess, can cause symptoms of nervousness and anxiety. It can increase the risk of heart attack by increasing the heart rate due to caffeine's effect on adrenaline. Caffeine increases blood pressure and can cause high blood pressure. Diarrhea: Caffeine can increase the risk of diarrhea by stimulating bowel movements.

DAILY CAFFEINE INTAKE

The amount of caffeine you should consume per day can vary depending on a person's age, gender, weight, health status, and tolerance. However, the maximum daily caffeine intake for a healthy adult is 400 milligrams. This amount is approximately 4 cups of coffee or 10 cups of tea.

Pregnant women should usually consume less than 200 milligrams of caffeine per day. The amount of caffeine consumed by children and teens can vary depending on their age and weight.

EFFECTS OF TAURINE

Taurine is a sulfonic acid formed in the body from the amino acids cysteine. Taurine is often referred to as a sulfur-containing amino acid and does not have a carboxyl group in the molecule. In small amounts, it is present in the tissues and bile of animals and humans. Derived from the Latin word taurus (bull), it was first extracted from bull bile by German scientists Friedrich Tiedemann and Leopold Gmelin in 1827. in lipid metabolism. , gives energy and improves metabolic processes, is a part of bile acids (taurochol, taurodeoxychol), which contribute to the emulsification of fats in the intestines. Capsules containing 100 mg of caffeine and 1,000 mg of taurine did not change average blood pressure 45 minutes after consumption, but after 70 minutes of continuous use, the memory test changed. high blood pressure. In a study by Baum and Weiss (10) comparing the effects of 500 mL of Red Bull EV on heart rate and stroke volume with or without taurine on pre- and post-workout heart rate, Baum and Weiss (10) showed that EV caused a significant increase in left atrial contractility. post-workout recovery period. The fact that this cardiac effect of increasing stroke volume was not observed with the consumption of taurine-free beverages, allowed the authors to speculate that taurine alone or in combination with caffeine is responsible for the increase in stroke volume (10). In addition, taurine deficiency is associated with a decrease in the sensitivity of the heart muscle to Ca2+ and a decrease in the inotropic ability of the organ [13] . Improves physical performance by improving blood supply to the rest of the body, especially the musculoskeletal system. Interestingly, the concentration of taurine in the muscles of the left ventricle of the heart of patients who died of chronic heart failure was higher than in patients who died of other causes and did not have heart pathology [14] . Research suggests that taurine may actually have inotropic effects, which may shed light on the adverse effects of energy drinks on the cardiovascular system.

EFFECTS OF SUGAR

It can be hypothesized that the sugars in EV may affect the cardiovascular system, since dietary calorie intake is usually accompanied by an increase in heart rate (15) and pulmonary ventilation rate (16). (16) A recent study found that drinking 500 ml of water containing fructose (60 or 30 grams), glucose (60 grams), or sucrose (60 grams) increased heart rate after 60 minutes. Sucrose and glucose have been shown to reduce total peripheral resistance and, as a result, reduce cardiac blood flow, while fructose, on the contrary, tends to increase total peripheral resistance (17) . Additionally, they observed that changes in heart rate were time-dependent, with

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significant increases only 45 minutes after consumption and peaks at 120 minutes [18].

ENDOTHELIAL DYSFUNCTION

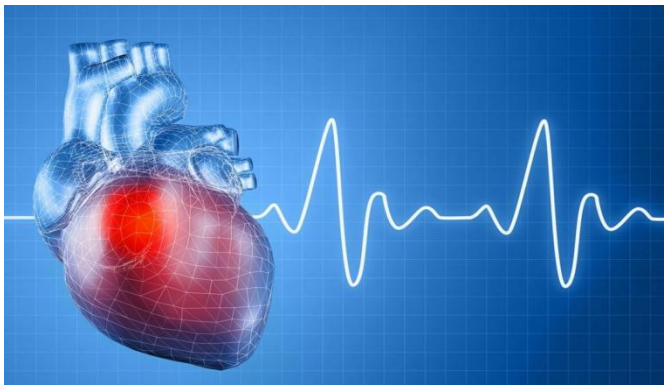
An additional explanation for the observed differential effect of fructose and glucose on changes in total peripheral resistance and blood pressure may lie in differences in endothelial function. Increased blood flow in skeletal muscle is an important physiological function of insulin [19] seen in impaired endothelial function in people with obesity and type 2 diabetes, both of which are associated with insulin resistance. As the release of insulin Fructose intake can lead to microvascular endothelial dysfunction, which contributes to high blood pressure. One study compared the hemodynamic effects of fructose, glucose, and sucrose and found no reduction in acetylcholine-mediated function of the microvascular endothelium [58]). Similarly, Bidwell et al. v. [G] observed that blood flow in the forearm in response to a beverage containing both glucose and fructose (a 45:55 ratio) was not lower than a beverage containing only glucose.

EFFECTS OF ENERGY DRINKS ON HEART RATE AND CAUSES OF ARRHYTHMIAS

Arrhythmia (Greek: *Arrhythmia)a* is *a negative suffix* and *rythmos* (*rhythm*) is a disorder of rhythmic movements that occurs during the normal activity of the heart. Arrhythmias can occur in sinus bradycardia, sinus tachycardia, sinus arrhythmia, ventricular fibrillation, ventricular fibrillation, and other types. The main problem that arises is the increased load on the muscles as a result of an irregular heartbeat and the subsequent onset of heart failure.

The following causes are closely related to the fact that energy drinks cause cardiac arrhythmias.

1. *Electrolyte imbalance in the blood* . Energy drinks are rich in various electrolytes, such as cations, such as potassium, magnesium, and calcium. They can cause electrolyte imbalances or changes that limit the normal activity of the heart.
2. *Changes in the amount of adrenaline and norepinephrine* . Changes in the chemical modification of energy drinks can lead to increased levels of adrenaline and norepinephrine. These hormones have a profound effect on the activity of the heart and lead to increased arrhythmias.
3. *Formation of cardiomyopathy* . Constant consumption of energy drinks can lead to the formation of cardiomyopathy, which leads to short-term changes in heart function and the risk of exacerbation of arrhythmias.



SUMMARY

In short, every energy drink consumed in excess is bad for your health. Since the norms for the consumption of energy drinks are not known, and their effects have not been fully and thoroughly studied, it is recommended to consume them in small quantities or not at all. We believe it is in your best interest to reduce your energy drink intake, as you may be predisposed to certain health-threatening diseases and cardiovascular risk mentioned above.

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